The cell types of the adenohypophysis in the rainbow trout (Salmo irideus)

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Chapter VI

GENERAL SUMMARY

THE PRESENT STUDY of the adenohypophysis of the rainbow trout deals with the following aspects:

1) a classification of secretory and non-secretory cell types, and a description of their histological appearance in September, in the adenohypophyses of male and female trout aged *circa* $2\frac{1}{2}$ years (chapters II–IV)

2) seasonal changes in the secretory activity of cell types in the adenohypophyses of trout, age between $1\frac{1}{2}$ and $2\frac{1}{2}$ years, fixed in eleven consecutive months (chapter V)

3) the relation between histological features of adenohypophysial cell types in different specimens of trout (mentioned under 1 and 2) and the activity of gonads or, occasionally, of interrenal and thyroid tissues, in order to obtain information on the function of the cell types (chapters II–V)

4) the effects of social rank (dominancy or submissiveness) on the histological appearance of certain cell types; social behaviour was hereto studied in small groups of trout (mentioned under 1) during $2\frac{1}{2}$ weeks preceding the fixation of the hypophysis and other endocrine glands (chapter III)

5. the comparison of histological features of the cell types and their presumed function in trout, with findings in the literature on similar or other teleost fish (Table 6).

The following characteristics of the adenohypophysial cell types were investigated: a) the topographical distribution of cells, belonging to one cell type, over the three adenohypophysial subdivisions (rostral pars distalis or rpd, proximal pars distalis or ppd, and pars intermedia or pi), b) morphological features like cell shape, position and shape of secretory granules, nucleus and other organelles, and c) specific staining properties of granules or other forms of secretion. In addition, histologically different activity phases in cells belonging to one cell type were studied.

The topographical distribution of cells and specific staining properties could only be satisfactorily investigated by light microscopy, using sagittal (para)median sections made through the entire hypophysis and stained with one of seven different staining techniques (chapter I). Pars intermedia cells, and adjacent nerve fibres, etc., were studied also by electron microscopy.

Seven secretory active adenohypophysial cell types were found: two acidophil cell types, i.e. type I (rpd) and type V (ppd); three basophil cell types, i.e. type IV (ppd etc.), type VI (ppd) and type IX (pi); and two amphiphil cell types, i.e. type II (rpd) and type VIII (pi). In addition, one chromophobe cell type, i.e. type VII (ppd) and one clearly non-secretory cell type, i.e. type III were present. Of special histological interest were type IV, VI, VIII and IX cells.

Type IV cells occurred in a considerable number of histologically different activity phases, especially in submissive fish. In certain phases, the cells could also be distinguished by argyrophil staining properties. A relation existed between the secretory activity of type IV cells, social rank and the activity of the interrenal cells, while DOCG injections had an influence on the histological appearance of the cells. Hence, type IV cells are presumed to produce ACTH.

The strongly basophil type VI cells, which contained two different types of granules, were thought to produce FSH- and LH-like hormones since the secretory activity of the cells was closely related to the development of the gonads.

The histological appearance of type VIII cells, which were also slightly PAS positive, was related to the (light) skin colour of the fish and hence, it was assumed that the cells produce MSH.

Type IX cells, which were very slightly basophil and whose function remained unknown, divided frequently by amitotis. The cells contained often different forms of (colloidal) secretion and occurred in a large range of sizes including a giant cell form.

Seasonal changes were found in type I, IV, VI and IX cells. The changes occurred mostly in relation with the reproductive period (around December till April) and were especially pronounced in type VI cells.